UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/523,230	01/31/2005	Jonathan Hughes	IA/3-22332/PCT	8037

324 7590 06/13/2007

CIBA SPECIALTY CHEMICALS CORPORATION
PATENT DEPARTMENT
540 WHITE PLAINS RD
P O BOX 2005
TARRYTOWN, NY 10591-9005

EXAMINER	
MACAULEY, SHERIDAN R	
ART UNIT	**PAPER NUMBER**
1609	

MAIL DATE	DELIVERY MODE
06/13/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/523,230	HUGHES, JONATHAN	
	Examiner	Art Unit	
	Sheridan R. MacAuley	1609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) *12-17 and 21* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,13 and 18-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 January 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/2/2005*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-21 are pending.

Election/Restrictions

1. Applicant's election of the species readable upon claims 1-10, 13, and 18-20 in the reply filed on March 21, 2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Applicant states in the response of March 21, 2007 that the elected species are readable upon claims 1-10, 13 and 16-21, however, claims 16, 17 and 21 are drawn to nonelected invention. Species group D, as set forth in the office action mailed on February 28, 2007, requires election of the various species of flocculation methods recited in claims 13-17. Applicant has indicated in the response that the flocculation method recited in claim 13 is elected. Likewise, species group F required election of the species of separation methods set forth in claims 20 and 21. Applicant elected distillation, as recited in claim 20. Therefore, claims 11, 12, 14-17 and 21 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to nonelected species, there being no allowable generic or linking claim.

1. Claims 1-10, 13, and 18-20 are examined on the merits in this office action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 18 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 18 is recites the limitation "the solid by-product material". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1, 3, 5 and 18-20 are rejected under 35 U.S.C. 102(b) as being anticipated by Brink (US Pat. 4,384,897, 1983). Claim 1 recites a method of producing a fermentation product comprising the steps of: (i) forming an acidified suspension of particulate plant-derived material comprising a first polysaccharide which is more readily hydrolysable and a second polysaccharide which is more difficult to hydrolyze, (ii) allowing the first polysaccharide to undergo hydrolysis by action of an acid at a temperature of at least 50 C under conditions such that the first polysaccharide is hydrolyzed and thereby forming a mixture of an aqueous liquor containing dissolved sugar and a solid residue containing the second polysaccharide, (iii) subjecting the

mixture to one or more separation steps in which the solid residue and aqueous sugar mixture are subsequently separated from each other, (iv) optionally washing the residue substantially free of the acid and the sugar, (v) passing the solid cellulosic residue to a further treatment stage in which the residue is subjected to the action of a dilute acid at a temperature of at least 50 C, such that the second polysaccharide is hydrolyzed and thereby forming a mixture of an aqueous liquor containing dissolved sugar and a solid residue, (vi) subjecting the mixture to one or more separation stages in which the solid residue and aqueous sugar mixture are separated from each other, (vii) optionally washing the residue substantially free of the acid and the sugar, (viii) adjusting the pH of the aqueous liquor from stages (iii), (iv), (vi) and (vii) to a pH of at least 4, (ix) passing the aqueous liquor from stage (viii) to a fermentation stage where the dissolved sugars are acted upon by a microorganism in a fermentation broth to produce a fermentation product, and (x) separating the fermentation product from the broth, wherein the method is characterized in that the separation stage in steps (iii) and/or (vi) is assisted by flocculation of a waste by-product, employing one or more flocculation agents selected from the group consisting of water-soluble polymers, water-swellable polymers and charged microparticulate materials. Claim 2 recites the limitation that the plant-derived material of claim 1 comprises softwood biomass. Claim 3 recites the process of claim 1 wherein the plant-derived material is cellulosic and comprises hemicellulose as the first polysaccharide and cellulose as the second polysaccharide. Claim 5 recites the limitation that the acid of claim 1 is sulfuric acid. Claim 18 recites the limitation that the solid by-product material of claim 1 comprises lignin. Claim 19 recites the limitation that

the fermentation product of claim 1 is ethanol. Claim 20 recites the method of claim 1 wherein the fermentation product is separated from the broth by passing the broth comprising the fermentation product into a distillation stage, where the fermentation compound is collected as a distillate and the residue "still bottoms" is removed.

7. Brink discloses a method of producing a fermentation product comprising the steps of forming an acidified suspension of particulate plant derived material comprising a first polysaccharide which is more readily hydrolysable and a second polysaccharide which is more difficult to hydrolyze (col. 1, lines 4-10; col.1 lines 16-21; col. 1 lines 36-40; col. 2, lines 32-41). Brink discloses hydrolysis of the first polysaccharide by action of an acid at a temperature of at least 50 C (col. 1, lines 16-21; col. 1, lines 36-40), subjecting the mixture to a separation step in which the solid residue and aqueous sugar mixture are separated from each other (col. 2, lines 48-52), passing the solid cellulosic residue to a further treatment stage in which the residue is subjected to the action of acid at a temperature of at least 50 C (col. 3, lines 58-63; col. 1, lines 25-27), subjecting the mixture to a separation stage in which the solid residue and aqueous sugar mixture are separated from each other (col. 4, lines 10-12), adjusting the pH of the aqueous liquor (col. 5, line 61-67), passing the aqueous liquor from a fermentation stage where the dissolved sugars are acted upon by a microorganism in a fermentation broth to produce a fermentation product (col. 1, lines 54-56), and separating the fermentation product from the broth (col. 1, lines 56-58). Brink teaches that the separation stage is assisted by flocculation employing a flocculation agent consisting of charged microparticulate materials (col. 10, lines 59-63). Brinks teaches that the acid

can be sulfuric acid (col. 9, lines 17-22), that the plant derived material is cellulosic, the first polysaccharide comprises hemicellulose and the second polysaccharide comprises cellulose (abstract), and that the solids may comprise lignin (col. 4, lines 29-35). Brinks teaches that the plant material can comprise softwood biomass, i.e. woodchips prepared from papermaking, forest waste such as stumps roots, branches; one skilled in the art would recognize that this would comprise softwood as well as hardwood (col. 2, lines 32-41). Brink teaches that the fermentation product may be ethanol, and that the ethanol may be separated from the broth by distillation (col. 1, lines 54-58, col. 8, lines 44-51).

8. Therefore, Brink anticipates all of the limitations of the cited claims.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

11. Claims 4, 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brink (US Pat. 4,384,897, 1983) in view of Brelsford (US Pat. 5,411,594, 1995). Claims 1, 2 and 5 are discussed above. Claim 4 recites the process of claim 1 wherein the acid has a pKa of below 4 and has a concentration of up to 2% by weight. Claim 6 recites the process of claim 1 wherein the hydrolysis of the first polysaccharide is conducted at a temperature of between 120 and 220 C for a period of 1 minute to 15 minutes. Claim 7 recites the process of claim 1 wherein the hydrolysis of the second polysaccharide is conducted at a temperature of between 120 and 220 C for a period of 1 minute to 15 minutes.

12. The teachings of Brink are discussed above. Brink also teaches that the first and second hydrolysis steps are carried out at temperatures of 140 to 220 C and 160 to 240 C, respectively (col. 1, lines 16-40). Brink et al. teaches the use of sulfuric acid, which has a pKa below 4 (CRC Handbook of Chemistry and Physics, p. 8-41). Brink is silent regarding the time period used for the first and second hydrolysis steps and the concentration of acid that may be used in the method.

13. Brelsford teaches a method of producing a fermentation product from lignocellulosic material comprising a two stage hydrolysis process wherein the hydrolysis of the first and second polysaccharide is conducted for 1 to 20 minutes at 135 to 195 C and 0.5 to 20 minutes at 165 to 260 C, respectively (col. 2, line 65-col. 3, line 43). Brelsford also teaches the use of 2% sulfuric acid during the hydrolysis of the first and second polysaccharides, and teaches that the lignocellulosic material may be softwood (col. 4, line 56-col. 5, line 29, col. 9, lines 4-6).

14. At the time of the invention, a method of producing a fermentation product comprising steps nearly identical to the claimed process steps was known in the art, as taught by Brink et al. It was further known in the art that dilute sulfuric acid could be used in the hydrolysis step, and that the hydrolysis claimed hydrolysis time could be used. The motivation to combine the teachings discussed above is provided by Brelsford et al., who teach that the two-stage hydrolysis using dilute acid reduces the amount of time and energy required for the conversion of cellulose to glucose (col. 4, lines 25-40).

15. One skilled in the art would have had a reasonable expectation of success in combining the teachings discussed above because the hydrolysis and fermentation methods taught by the references are well known in the art and both methods use the same starting material, i.e. lignocellulosic material, to produce sugars which are used for the production of a fermentation product. It would therefore have been obvious to one of ordinary skill in the art to combine the teachings discussed above to arrive at the claimed invention.

16. Claims 8-10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brink in view of Kuo et al. (US Pat. 5,529,699, 1996). Claim 1 is discussed above. Claim 8 recites the process of claim 1 wherein the flocculating agent is a water-soluble polymer. Claim 9 recites that the polymer of claim 8 is former from a water-soluble monomer or blend of monomers. Claim 10 recites that the polymer of claim 8 is a polyacrylate salt. Claim 13 recites the process of claim 1 wherein the flocculation is

effected by employing a water-soluble or water-swellable polymer and a charged microparticulate material.

17. The teachings of Brink are discussed above. Brink does not teach the use of a water-soluble polymer as the flocculant, specifically one that is made from a water-soluble monomer or blend of monomers, or one that is a polyacrylate salt. Brink does not teach flocculation using a water-soluble polymer and a charged microparticulate material.

18. Kuo et al. teaches the use of flocculants as aids in pulp and papermaking systems (col. 9, lines 47-49). The flocculants of Kuo et al. that the flocculants can be water-soluble polymers formed from a water soluble blend of monomers, and that the flocculants can be polyacrylate salts (col. 3, lines 47-60, col. 10, lines 24-34). Kou et al. also teach that the flocculation can be effected using a water-swellable polymer and a charged microparticulate material (note that several of the suitable particulates taught by the reference are charged particles, e.g. clay and alumina; col. 9, line 56-col. 10, line 12).

19. At the time of the invention, a method for the production of a fermentation product from lignocellulosic material comprising nearly all of the claimed elements was known, as taught by Brink. It was further known that the claimed water soluble polymers, specifically in combination with charged microparticulates could be used for the separation of pulp in papermaking systems, as taught by Kuo et al. One skilled in the art would be motivated to combine the teachings discussed above because Kuo et al. teach that the charged polymers are desirable for use as flocculants because their

charge is pH-independent (col. 3, lines 26-29), which would be desirable in the method taught by Brink et al. because it is conducted under acidic conditions.

20. One of ordinary skill in the art would have had a reasonable expectation of success in combining the teachings of Brink and Kuo et al. because both inventions use flocculants for the same purpose, i.e. the separation of lignocellulosic material (note that this would be implicit to the teachings of Kuo et al., who disclose using the flocculants as drainage/retention aids for pulp in papermaking). It would therefore have been obvious to one of ordinary skill in the art to combine the teachings discussed above to arrive at the claimed invention.

21. Thus, the claimed invention as a whole was *prima facie* obvious over the combined teachings of the prior art.

Double Patenting

22. Claims 1-3, 5, 8-10 and 13 and 18-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4, 5, 7, 8, 10 and 11 of copending Application No. 10/523229 in view of Brink (US Pat. 4,384,897, 1983). Claims 4, 5, 7, 8, 10 and 11 of copending Application No. 10/523229 are directed to a method of producing a fermentation product nearly identical to the method claimed in the cited claims of the instant application. The claims of the copending application do not recite first hydrolyzing readily hydrolysable polysaccharides and to subsequently hydrolyzing polysaccharides which are more

difficult to hydrolyze. The teachings of Brink are discussed above, who teach the additional limitations claimed by the instant application. The motivation to combine these teachings is provided by Brink, who teaches that the 2-stage process enhances the yield of sugars from lignocellulosic materials. One of ordinary skill would have a reasonable expectation of success in using the 2 stage process of Brink in the process claimed in the copending application because the process of Brink was known to be effective in the claimed process of the production of a fermentation product, as discussed above. The cited claims of the instant application are therefore rendered obvious in view of the copending application and the prior art.

This is a provisional obviousness-type double patenting rejection.

23. Claims 1-10, 13, and 18-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 4, 5, 7, 8, 10 and 11 of copending Application No. 10/523229 in view of Brink (US Pat. 4,384,897, 1983) and further in view of Brelsford (US Pat. 5,411,594, 1995). The claims of the copending application and the teachings of Brink are discussed above; these references do not teach the use of an acid with a concentration up to 2%, or the time periods for the hydrolysis of the first and second polysaccharides. The additional limitations claimed by the instant application are taught by Brink and Brelsford, as discussed above. The motivation to combine these teachings is discussed above. The cited claims of the instant application are therefore rendered obvious in view of the copending application and the prior art.

24. This is a provisional obviousness-type double patenting rejection.

Information Disclosure Statement

25. The information disclosure statement filed on May 2, 2005 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. Those references that are struck through on the signed copy of the IDS have not been considered, because they were not included in the IDS.

Conclusion

No claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sheridan R. MacAuley whose telephone number is (571) 270-3056. The examiner can normally be reached on Mon-Thurs, 7:30AM-5:00PM EST, alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mary Mosher can be reached on (571) 272-0906. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SRM

MARY MOSHER
SUPERVISORY PATENT EXAMINER

6-8-07